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Profitability of Practices Affecting the Calf Crop Of Beef Herds

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INTRODUCTION

Beef cow herds are an important enterprise in western Ohio. Even in highly productive crop areas there are farms with large acreages of rotation meadows. Many farms have considerable rolling or flood land suited only for permanent pasture. A forage-consuming type of livestock is required to utilize this production. Other productive activities on many of these farms demand most of the labor and capital available. Beef cow herds profitably utilize available forage and fit well with the other demands for labor, buildings and capital on relatively large western Ohio farms. Because of these and other favorable conditions, beef cow numbers in Ohio have increased from 59 thousand in 1940 to 270 thousand in 1959.[1]

PURPOSE OF STUDY

Efficient use of resources directed toward the production of a weaned beef calf is important. The calf crop is the major or only source of income from a beef cow herd. There are many factors affecting calving percentage associated with a beef herd from time of breeding until the calves are weaned. Some factors can be controlled by the farmer.

This study was designed to determine the importance of managerial practices affecting calving percentage and returns from the beef cow enterprise. An attempt was made to isolate the effect each practice had on the calf crop.

METHOD OF STUDY

The 12-month interval, October 1, 1957 to September 30, 1958, was used as the period of study. Three contacts were made to 100 western Ohio farmers operating commercial beef cow herds. These were selected as a stratified random sample of all commercial beef herds in ten west central Ohio corn belt counties (see map).

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[1]Agricultural Marketing Service, "The Livestock and Poultry Inventory," United States Department of Agriculture, January 1, 1960.

The farms were selected by four sizes of herds as follows: 10 to 25 cows, 26 to 50 cows, 51 to 75 cows, 76 cows and over. All the herds were operated in a commercial manner.

Information was obtained by interview with the farm operator and by observation. Management practices affecting calves weaned were analyzed by those associated with (1) cows failing to produce a calf and (2) calf losses between calving and weaning.

Fig. 1.—Location of the 100 Commercial Beef Cow Herds, Ohio, 1958

The percentage of calf crop (the number of calves weaned divided by the number of cows and heifers exposed to breeding) was used as a yardstick for measuring the output of a beef cow herd.

TERMS AND DEFINITIONS

Cows—All females that produced one or more calves.

Heifers—Those females producing their first calf.

Barren cows—All females exposed to breeding but failing to produce a calf during a 12-month period.

Births—All full-term calves dropped, including still births, deformed calves, etc. (Abortions not included.)

Calf losses—All losses from birth to weaning.

Conception rate—Cows and heifers dropping full-term calves as a percent of total animals exposed to breeding.

Livability rate—Number of calves weaned as a percent of total calves dropped.

Percent calf crop—Number of calves weaned as a percent of total animals exposed to breeding.

FINDINGS

On the 100 farms, 5674 cows and heifers were exposed to breeding during the year. Of these, 374 failed to calve and 30 cows produced two calves in 12 months. Nineteen of the 30 cows producing more than one calf per year had twins. Eleven cows calved twice within 12 months. Of the 5330 calves born, 4988 were weaned. These 100 farms averaged 57 cows, ranging from 10 to 271 cows (Table 1, Appendix).

Conception Rate

For each 100 cows exposed to breeding, 93 dropped a calf. On a third of the farms, every cow exposed to breeding dropped a calf. Over 40 of the 100 herds had a conception rate of 98 percent or better, and 60 farms had a conception rate of 95 percent or better. Only 15 farms had conception rates under 90 percent (Table 2, Appendix).

Herd Size and Cow-Bull Ratio. Herd size and cow-bull ratio are closely related factors, and one often determined the other. The number of cows in the herd or the number of cows operated in a separate unit was often determined by the number of cows one bull could breed.

TABLE 1.—Cow-Bull Ratio and Conception Rate, by Size of Herd, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Size of herd	Farms	Size herd	Cow-bull ratio	Percent conception rate*
10- 25	26	17	16.2	95.2
26- 50	29	39	25.2	94.5
51- 75	24	65	27.6	97.1
76-271	21	121	23.3	90.3
Total	100	57	24.0	93.4

* $X^2 = 9.91$ significant at the one percent level.

NOTE: The tables in this bulletin were tested by X^2. The test was used to determine if the variation in conception, livability, or overall calving percentages was greater than could be expected from sampling.

Highest conception rates were obtained on herds with 51-75 cows. Herds of this size usually had two herd bulls.

On the 100 farms in the study, an average of one bull was kept for every 24 cows. Highest conception rates were attained on herds with 8-15 cows per bull. One bull was kept for every 16-30 cows on 59 of the farms. On 19 farms, one bull was kept for each 31-45 cows, and on 8 farms, one bull was kept for each 46-60 cows (see Table 2).

The problem is to determine when the addition of another bull can be justified. The average value of a calf at weaning is around $100

TABLE 2.—Conception Rate and Herd Size, by Cows per Bull, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Cows per bull	Farms	Number of cows and heifers			Percent conception*
		Total	Barren	Per herd	
8-15	14	324	13	23.1	96.0
16-30	59	3675	233	62.3	93.7
31-45	19	1116	66	58.7	94.1
46-60	8	559	62	69.9	88.9
Total	100	5674	374	56.7	93.4

* $X^2 = 22.5831$, significant at one percent level.

and the annual cost of a herd bull $125.[2] On this basis, the break-even point for one-bull herds would be about 28 cows. Farmers with small herds might find it more profitable to own a bull jointly with a neighbor or to rent a bull. A few of the farmers with small herds in the study were members of artificial breeding associations.

About 28 cows (25 to 30) per bull were ideal for the one and two-bull herds. Fewer cows were serviced per bull on the larger herds. An average of 22 cows were kept per bull on herds with three bulls. These herds maintained a conception rate of 97 percent. Herds with more than 75 cows had a bull for every 18 to 20 cows.

Farmers experienced higher breeding costs when a small number of cows were served per bull, but there was greater assurance of all cows producing a calf. Herds with more than 45 cows per bull had an average conception rate of 89 percent which was 5 percent lower than most other herds.

On many farms, it is difficult to maintain a desirable cow-bull ratio. Frequently herds were too large for one herd bull but too small for two bulls. Consequently, conception rate was sacrificed rather than adding another bull. Some adjustment of herd size may be desirable to maintain high conception rates and a low breeding cost.

Length of Breeding Season. The length of the breeding season ranged from 42 to 365 days. Breeding periods were shorter on farms with larger herds. Increasing the length of the period or using two periods had little effect on conception rate. Costs were not increased on farms with long breeding periods but may have increased the number of calves dropped.

Breeding seasons were controlled in order to plan calving and ultimately marketing dates. Factors other than increasing conception rate were usually responsible for increasing the length of the breeding season. Even though the bull ran with the cows year around on some farms, calves were fairly well grouped. This is the result of prior herd management.

Long breeding seasons minimized the need for separate management of the herd bull. On many farms, the bull was turned on pasture with the cows during May and remained with the herd until calving time. Ususally the bull was handled separately from calving time (March) until the coming pasture season (May).

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[2]The annual cost of keeping a bull was based on the cost of keeping a cow on these herds ($102.34) adjusted for extra labor, facilities, and depreciation incurred in maintaining a herd bull.

TABLE 3.—Conception, by Type of Housing During Winter, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Type of housing	Farms	Number of cows and heifers		Percent conception*
		Total	Barren	
Cows confined to small area with access to shelter	52	2451	161	93.4
Cows on pasture with access to shelter	33	2338	169	92.8
Cows on pasture with woods or limited cover	15	885	44	95.0
Total	100	5674	374	93.4

* $\chi^2 = 5.180$, not significant at the five percent level.

Housing. Housing and feeding programs during the winter months were indicators of care given the cows.

Fifty-two farmers confined their cows to a barn with a small lot and 33 provided some shelter while the cows were on winter pasture. Only 15 herds were without shelter during the winter. However, these herds did have access to woods or other limited cover. Conception rate among the three types of housing in this study was not significantly different. Cows were kept in good breeding condition with a minimum of winter housing (Table 3).

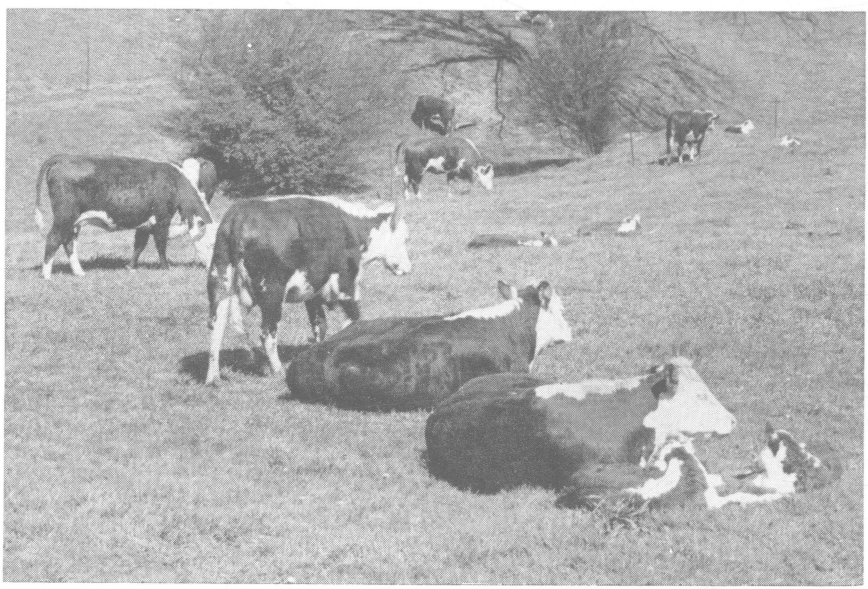

Fig. 2.—Beef cow herds profitably utilize available forage on large western Ohio farms.

The herd sire was either confined to a box stall and a small exercising lot or was wintered with the cows. Forty of the farmers isolated their herd bulls during the winter. These bulls were fed a higher quality ration than the cows. Caring for the bull in this way required more feed, facilities and labor than letting him run with the cows. The practice of isolating the bull during the winter was followed to control calving dates. Conception rate was not affected.

Feeding. The pounds of total digestible nutrients reported fed were compared to Morrison's standards for beef cows during gestation.[3] A beef cow weighing 1100 pounds requires 8-11 pounds of TDN per day.

The average level of feeding on these farms was 13 pounds TDN per cow per day.

Farmers supplying less than 8 pounds of TDN per day for each cow did not adequately feed their cows throughout the winter. These cows usually received poor quality hay and/or silage without grain and supplements. Most of these herds had access to some winter pasture which provided some nutrients.

Farmers overfeeding and underfeeding experienced lower conception rates than those feeding 10-15 pounds of TDN per day. In either case, the gross returns were lower, and in addition, costs were higher by overfeeding. In a commercial beef breeding enterprise, feed accounts for two-thirds of the total costs.

[3]Morrison, Frank B., **Feeds and Feeding**, Morrison Publishing Company, Ithaca, New York, 22nd Edition, 1956.

TABLE 4.—Percent Conception, by Level of Feeding Cows during Gestation, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Level of feeding (pound of TDN fed/cow/day)	Farms	Number of cows and heifers		Percent conception*
		Total	Barren	
High 16-30	25	1056	91	91.4
Average 10-15	50	3085	169	94.5
Low 6-9	25	1533	114	92.6
Total	100	5674	374	93.4

* $\chi^2 = 14.751$, significant at one percent level.

Age of Bull. Thirty-four farms had more than one bull. The effect the sire's age had on conception could not be measured on these farms. Conception rate on these 34 farms averaged 93 percent. None of the 100 farmers used a bull under 18 months as the only herd sire, and only three used a bull over seven years old. In this study, age of bull did not affect conception rate because these farmers were careful about maintaining a healthy bull of serviceable age.

First-Calf Heifers. The average conception rate for first calf heifers was 12 percent lower than for the cows.

Approximately eight percent of all females were first-calf heifers. Herds with no heifers averaged 94 percent conception compared to 92 percent for those with first-calf heifers.

TABLE 5.—Conception Rate of Cows and First Calf Heifers, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Group	Number of cows and heifers		Conception rate*
	Total	Barren	
Cows	5222	301	94.2
First calf heifers	452	73	83.8
Total	5674	374	93.4

* $\chi^2 = 71.7688$, significant at the one percent level.

Failing to cull carefully, particularly old cows, also lowers conception rate. More attention to culling can greatly reduce the number of barren cows, therefore increasing returns.

Seventy percent of the 452 heifers were bred as yearlings, with a conception rate of 79 percent. In contrast, the heifers bred as two-year-olds had a conception rate of 98 percent. By breeding heifers as yearlings, the productive life of the cow is increased which usually more than offsets the lower conception rate of yearling heifers. Handling the yearling heifers separately during the breeding period with fewer numbers per bull and close observation could improve conception rates.

Factors Affecting Livability

Of the 5330 calves born, 342 died before weaning, or for each 100 calves born on these farms, 94 were weaned.

Of calves dying, eighty-four percent, or 286 calves, died during the first week following birth. The cause of a large proportion of these

TABLE 6.—Cause of Calf Losses and Time of Occurrence, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

(5330 calves born)

Cause of death	First week of age	Over one week of age	Total losses
Born dead	36	--	36
Scours and pneumonia	20	24	44
Bloat	--	10	10
Accident	9	5	14
Other*	12	--	12
Unknown	209	17	226
Total	286	56	342

*Dwarf, deformed calves and premature births.

losses could not be explained by the farmers. If calf losses are going to be reduced, more time and effort are needed during the first week of calving. Cost of keeping a cow for one year averaged $100. Every calf saved helps offset this cost. Additional checking of the herd proved very effective.

Only 56 of the 342 deaths occurred after the first week of age. Most of these deaths were caused by accidents or diseases. There were 10 cases of bloat and 24 cases of pneumonia and scours. Some of these losses might have been prevented by more careful management. The question is, would the cost of reducing calf losses on a typical farm exceed the value of the calf? These calves lost represent a potential return of over $34,000. If only 25 percent of these calves had been saved, the increased income would have averaged over $85 per farm.

First-Calf Heifers. The livability rate for calves from first-calf heifers was 9 percent lower than for the cows.

A high replacement ratio could lower profits. Keeping the number of first calf heifers at a minimum permits a farmer to give them the careful attention needed at calving. Replacing periodically makes it possible to care for several heifers at a lower cost than when caring for one or two per year. However, under this program, a farmer is risking a slight drop in the number of productive cows between the replacement years.

Yearly replacement also necessitates an extra bull to avoid inbreeding. Cows are not culled for a few years, then a high percentage are

TABLE 7.—Percent Livability of Calves from Cows and First Calf Heifers, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Group	Number	Births	Calf losses	Percent livability*
Cows	5222	4951	289	94.2
First calf heifers	452	379	53	86.0
Total	5674	5330	342	93.6

* $\chi^2 = 36.1219$, significant at the one percent level

replaced and herd bulls are changed. Whether annual or periodic replacement is used, the number of cows replaced per year should average around 12-14 percent.

Time of Calving. A comparison between winter or confined calving and summer or pasture calving was made. Livability rates during June, July and August were 2 to 3 percent below the heavy winter calving months despite more adverse weather conditions in the winter. This may be due to the increased care devoted to the herd in the winter months. Pressure from other farm work during the summer is greater, and thus less attention is given to the beef cows.

Thirty-eight percent of the cows in small herds (10 to 25 cows) calved on pasture. This percentage decreased steadily until only 22 percent of the calves in large herds (76-271 cows) were born on pasture. The remainder of the calves were born before the cows were turned on pasture.

Early calves were desirable for the attainment of heavy weights at fall marketing. The heaviest concentration of calving occurred during February, March, April and May. During this time, 77 percent of the calves were born.

Care of Cows at Calving. Housing—Before calving, whether the cows were confined to buildings or had only a woods or no shelter or cover did not affect the percentage of calf losses. Forty-seven farmers used the same housing for calving as during gestation.

These farmers made no attempt to individually or group isolate the cows at calving. Twenty-one farmers isolated over half of their cows in individual box stalls. Six farmers isolated groups of heavy springers from the herd, confining them to a common area. Several farmers isolated only individual cows having difficulty at calving time. The

extra labor and facilities used to isolate the cows and heifers at calving did not significantly change the percentage of calves weaned.

Under conditions other than experienced on these farms, housing may have a significant effect on calf losses. This may be especially true on farms with woods or limited cover available during calving. However, on these farms, 70 percent of the cows dropped calves during December, January, February and March with an average of 94 percent livability.

Labor—The man-hours involved at calving, besides daily chores, varied from one hour per cow for the large herds to two hours per cow for the small herds. Extra labor amounted to about one hour per cow with 83 percent of the time spent for checking the herd, 10 percent spent for isolating animals and 7 percent for assisting cows.

An overall increase in livability with additional checking was evident for both winter and the pasture season. Farmers that checked four or more times per day, in addition to chores, had a 5 percent higher livability than farmers checking fewer times per day. The increase in livability because of additional checking during calving was statistically significant.

Returns would be less than those figures presented for herds with less than 50 cows and higher for herds with more than 50 cows. This is explained by the time spent travelling to and from the barn. Also, farmers checking fewer times per day spent more time per visit than those farmers looking the herd over more frequently.

TABLE 8.—Costs and Returns from Additional Checking* of the Beef Breeding Herd at Calving Time for a 50-Cow Herd, Western Ohio, 1958

Times checked per day	Total hours spent per cow in checking	Returns from additional calves†	Labor cost for checking‡	Net returns	Returns per hour
1	.8	$ 41.64	$40.00	$ 1.64	$ .04
2	.9	83.29	45.00	38.29	.85
3	1.0	124.93	50.00	74.93	1.50
4 or more	1.2	166.58	60.00	106.58	1.78

*In addition to daily chores, usually for a calving period of 50-60 days

†Calf value at $104.11 at weaning (based on study)

‡Labor valued at $1.00 per hour.

The labor spent assisting cows at calving accounted for about 7 percent of the total calving labor. Sixty-four first calf heifers or 14 percent of the heifers were helped by the farmer or the veterinarian. Only about 3 percent of the cows were assisted. Sixty-six or about one percent of the cows and heifers were treated for placenta removal by a veterinarian.

It is not known how many calves were saved for the efforts expended, but every calf saved returned over $100. The labor bill for assisting

Fig. 3.—Early calving was desirable for the attainment of heavy fall calves.

TABLE 9.—Cows and First Calf Heifers Assisted during and After Calving, by Size of Herd, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Size of herd (cows)	Farms	Cows	Heifers	Cows assisted		First calf heifers assisted	
				During calving	Placenta removal	During calving	Placenta removal
10- 25	26	399	55	23	6	6	1
26- 50	29	1057	77	30	23	13	0
51- 75	24	1463	85	30	13	15	1
76-271	21	2303	235	24	19	30	3
Total	100	5222	452	107	61	64	5

was about $250 ($1.00 per hour). If assistance would have saved one-half of the calves involved, the gross returns would have been increased $11,600 on these farms or an average of $116 per farm.

SUMMARY AND CONCLUSIONS

Based on cost and returns of 100 commercial beef breeding herds in western Ohio, a return above all costs cannot be expected from herds with a calving percentage below 88 percent (Table 10).

Many of the practices studied did affect calving percentage. Farmers with low productive herds must analyze their management practices in an attempt to increase calving percentages above the break-even point.

The overall calving percentage was 88 percent for the 100 farms. Six to seven cows in every 100 exposed to breeding failed to produce a calf. In addition, six to seven cows in 100 lost their calves between birth and weaning.

The most important management practices affecting calving percentage were the number of cows per bull, labor spent in checking during calving (in addition to daily chores) and the percentage of first-calf heifers in the herd. Highest calving percentages and profitability were attained for a herd having:

(1) 50-75 cows

(2) 2 herd bulls

(3) An average replacement of 12-14 percent of the herd each year.

TABLE 10.—Calf Crop and Net Returns, 100 Commercial Beef Breeding Herds, Western Ohio, 1958*

Calving percentage	Number of farms	Net return per cow†	Size of herd	Percent of farms with net return above all cost‡
95-100	25	$ 18.41	52	70
91- 95	25	9.05	62	60
86- 90	25	— 3.11	64	40
45- 85	25	—30.58	49	15
Average	100	$— .83	57	47

*E. T. Shaudys and J. H. Sitterley, "Costs and Returns of the Beef Breeding Enterprise in Western Ohio," Ohio Agricultural Experiment Station, Wooster, Ohio. Research Circular 73, August, 1959.

†Includes first calf heifers. Total cost was $102.34 per cow. Total return for a cow producing a weaned calf was $114.10 ($104.11 for a weaned calf at 432 pounds, $7.81 manure credit, $2.18 cull cow sales and change in inventory. The return of manure credit, sales and change in inventory were credited to all cows.)

‡Practically all farms covered cash cost $56.63 per cow. Returns above cash cost averaged $44.88 per cow.

(4) 3-4 visits per day to look over the herd during calving.

Other factors studied that were not significant in affecting calving percentages could have had an effect on profit. Some of these are:

(1) Time of calving—early calves are desirable for the attainment of heavy weights for fall marketing.

(2) Length of calving season—shorter seasons give uniformity of the calves at most profitable marketing dates.

(3) Housing and feeding—may affect the health and size of calf and, in turn, the pounds of beef produced per cow. Underfeeding and overfeeding lowered conception rates.

Heredity, weather, sterility and other biological factors could have an important effect on calf crop. These factors were detectable in some of the extreme cases but could not be measured in most instances. Many of these factors cannot be predicted which accounts for the use of a safety factor in many of the farmers' management decisions.

Most herds studied had a high calving percentage. But there is room for improvement on many herds. The question of how much time and capital should be used in improving calving percentages is difficult to ascertain. Decreasing the cow-bull ratio, increasing the

length of breeding season and some extra labor at calving time can profitably increase calves weaned if kept within the realm of practical management. Beyond this point, attention given to other phases of the business may be more profitable.

Calf crop is the major or often the sole return of the cow herd. Every calf saved adds to farm income. Efficient management can improve calving percentage. A small investment in labor during the calving season may earn a high rate of return.

APPENDIX

TABLE 1.—Cows, Births and Calf Losses, by Size of Herd, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Cows per herd	Number of farms	Cows exposed to breeding	Barren cows	Multiple births	Calves born	Calves died	Calves weaned
10- 25	26	454	22	4	436	35	401
26- 50	29	1134	62	13	1085	84	1001
51- 75	24	1548	45	4	1507	86	1421
76-271	21	2538	245	9	2302	137	2165
Total	100	5674	374	30	5330	342	4988

TABLE 2.—Number of Farms, by Conception Rate, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Conception rate	Number of farms
100	31
98-99	10
96-97	18
94-95	9
92-93	13
90-91	4
88-89	4
51-87	11
Total	100

TABLE 3.—Farms by Percent Livability, 100 Commercial Beef Breeding Herds, Western Ohio, 1958

Percent livability	Farms
100	17
95-99	30
90-94	27
85-89	16
80-84	7
60-79	3
Total	100